

DAMPS Coming In Year's Time

Real Time Software For 360/44s

WHITE PLAINS, N.Y. - IBM has announced a new computer program that links its System/360 Model 44 directly to research tools such as wind tunnels, cyclotrons and analog computers.

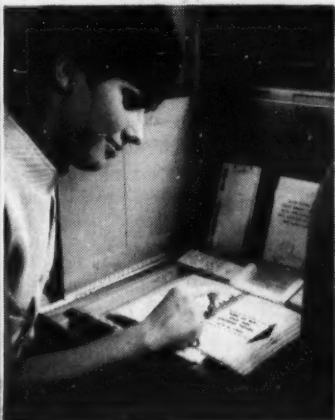
Called Data Acquisition Multiprogramming System (DAMPS), the program enables the Model 44 to process a wide range of on-line, real-time scientific jobs, particularly those requiring quick response to many external events. It also reduces the programming effort required to implement such applications.

DAMPS supports 32 levels of priority interrupt from process units linked to the Model 44 through an IBM 1827 data control unit. Its features, which are extensions to the System/360 Model 44 programming system, include:

- special routines which speed response to an external event;
- easy scheduling of foreground processing during priority interrupt;
- dynamic adjustment of programs used for responding to priority interrupts;
- a special channel scheduler for channels dedicated to the processing of real-time data;
- ability to save and restore, at the user's discretion, only as much of the computer status at interrupt time as necessary.

DAMPS is scheduled to be available in the third quarter 1968.

It's Election Week



COMPUTER COUNTS VOTES - Boston College DP Center is being used to count the votes in a Massachusetts election this week.

IBM Doubles Domestic Disk-Pack Plant

SAN JOSE, CALIF. - IBM has announced the expansion of their existing disk-pack facilities here - which have been more than doubled in size to 78,000 square feet. The corporation expects to be producing "several thousand packs per week" in the facility sometime next year.

Extensive new process equipment - including automatic ultrasonic systems to clean disk pack components have been installed, and a new, on-line com-

puter is being used to assure improved control of test operations.

The expansion of production may help reduce the present delays being experienced by IBM customers in getting the disk-packs. Presently these delays are running from three to nine months.

A number of competitive firms recently announced that they will shortly be offering deliveries of IBM-compatible disk-packs. However, it is not expected that the production capacity of these firms will be more than 10%-20% that of IBM's during the next year.

NBS To Survey Program Exchanges, Make Lists

WASHINGTON, D.C. - The National Bureau of Standards will sponsor a survey of services for the exchange of computer programs and program documentation. The two-phase survey is being conducted for the Technical Information Exchange of the Bureau's Center for Computer Sciences and Technology.

The first phase will involve interviews with organizations which exchange, lease or sell programs and documentation. The survey will determine the nature of services offered, the number and types of programs involved, and the extent to which program catalogs exist. A roster of program exchange organizations will be published.

The second phase will include interviews with users to determine the usefulness of a "master catalog of all programs and documentation available."

France Has Inadequate Home-Based Industry

Computer Power Influences Common Market Policies

By a COMPUTERWORLD Staff Reporter

The British computer industry, which is the only well-based computer industry in Western Europe, is being used by the pro-British members of the European Common Market to help break DeGaulle's veto on British entry into the Common Market. This is probably the first time since computers helped with the creation of the atomic bomb towards the end of World War II, that world politics are being directly affected by them.

This development came when France wanted to reduce the tech-

nology gap between Europe and America. The French asked for practical work immediately to integrate the capabilities of Europe technically and to reduce the so-called technology gap. However, as computers were a major part of this, the Dutch and other Common Market members sought to delay matters so as to put pressure on the French to allow Britain to join the Market.

As well as Holland, Belgium, Luxembourg and Italy went along with the go-slow movement.

At the moment, a compromise has been reached to have a committee report next March so that in June the recommendations can be submitted to the Common Market Council of Ministers.

The situation has its own amusing side, as leaders of the British computer industry recently have been insisting that the "Technology Gap" never did exist.

For example, in the October issue of International Business Automation, Basil de Ferranti, managing director for strategy of Britain's International Computers and Tabulators, Ltd., was quoted as saying, "I suspect it was something that was cooked up by the State Department in order to make it a lot easier to sell American goods throughout the world. . . We would feel very strongly that there is no such gap."

Sir Basil was associated with the Ferranti Atlas computer, often quoted as being the world's most powerful system, before Ferranti merged into the ICT group.

New Professional Society Named

NEW YORK - A new professional society was born here at the annual convention of the American Documentation Institute. In the course of the Institute's 30th annual meeting, it was announced that the Institute had reconstituted itself the American Society for Information Science.

More than 80% of the members voting in the proposal favored the name change which, according to society president Dr. Bernard M. Fry, "reflects the fact that information science has come of age and our society has become its most representative professional organization."

Over 1500 members met in New York during the week of October 22 to discuss "Levels of Interaction Between Man and Information." Specific topics of discussion included new forms of publishing, use of computers as an assembly line for information, the problem of determining what information should be stored, the futility of unorganized information, the development of national networks for storing and retrieving information, and the difficulties of translation and vocabulary building.

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**FALL JOINT
COMPUTER
CONFERENCE**

SPECIAL PREVIEW

See Pages 5 thru 8

Editorials

The End Of Two Eras

The Fall 1967 Joint Computer Conference marks the end of the central processing era. The developments of displays, remotes and communications systems, the acceptance of multi-programming and time-sharing are so widespread, that the era now belongs to the operating system and to the communications networks.

This is now known and accepted. But have you realized that it is also the end of an era so far as the evaluation techniques are concerned? In the past our evaluations have primarily been to decide which of the proposals submitted by three or four manufacturers shall be accepted.

Now, the evaluation teams will have to dig a lot deeper. No longer is the single vendor for hardware, software and communications the **only** answer. There are so many worthwhile alternatives.

Killing A Red Herring

One of the pervading problems which come to DP managers is - how to justify their evaluations to higher non-technical management. This particularly occurs when the evaluation, and recommendation, appears to be going against the tide. That is to say - when it goes against the industry giant's proposal.

Many managers have experienced the difficulty of persuading their seniors that the success of IBM lies in their internal management policies rather than in the product.

Now, this particular red herring can be more easily laid to rest.

In his Forbes interview this week, Mr. Thomas J. Watson acknowledges that it is in management - rather than in product - that the great difference lies between the various vendors.

That should kill that particular red herring.

Mature Or Obsolete?

A mature organization is one which earns its own keep - and does not rely on charity. An obsolete organization is one which exists, but stands in the way of progress. Both maturity and obsolescence have one thing in common - they presuppose an earlier, active existence. As a result "Mature" can be, and has been, used as a euphemism for obsolescence.

However, it is easy to tell a really mature organization from an obsolete one. The test is "Does it support itself?" If it does - then it is mature. If not - well, you have your answer.

Nowadays many computer user groups are being called "Mature".

Will they earn that honorable title?

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

TM Reg. U.S. Pat. Off.

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Letters To The Editor

To the Editor:

Enjoy reading COMPUTERWORLD each week. News is broad and informative. Keep up the good work.

F.A. Ross

Data Processing Manager

Wright Line

Worcester, Massachusetts 01606

To the Editor:

I'm finally getting around to ordering my subscription to COMPUTERWORLD, despite the fact that I was crushed by not having ADR listed as one of the "theys" which moved last week.

I searched your list using every modern accessing mode technique for the good old company name but, alas, unsuccessfully. After carefully closing the door, I resorted to the old fashioned serial accessing technique ignoring all hierarchies, but again to no avail. So how about getting us listed? We are Eastern Over-the-Counter out of New York.

Anyway, start sending the scandal sheet and this affluent, aggressive organization will pass the plate amongst our hungry employees (we're a little conservative about some things) for sufficient bread for a year's subscription.

James H. McLeod

Technical Manager

Applied Data Research, Inc.

O.K. Ed.

To the Editor:

I would greatly appreciate it if you would list the quotations for Applied Data Research (an over-the-counter stock) in your weekly stock market reports. Thank you.

Neal Koss, M.D.

Medical Officer

Department of Health, Education, and Welfare

O.K., O.K. Ed.

To the Editor:

We are now receiving the COMPUTERWORLD here in the Kansas City Honeywell EDP office with regularity, and I must say we are enjoying it thoroughly. Our heartfelt congratulations to you and Mr. McGovern for producing an informative and interesting, if not sometimes amusing, computer weekly.

Best wishes for continuing success.

Michael T. O'Donnell

Systems Manager

Honeywell EDP

To the Editor:

Our local chapter of the Armed Forces Management Association is a non-profit educational organization with 250 members. We have a monthly newsletter and request authority to reprint "Are Women A Problem" from the July 26, 1967 issue of COMPUTERWORLD, with due credit to Everett D. Parker and COMPUTERWORLD.

Incidentally, I am a subscriber (Aniston Army Depot) and enjoy COMPUTERWORLD very much. I missed the first eight issues some way. Do you have extra copies?

Thomas R. Bowerman

Chairman, Publications Committee
Armed Forces Management Association
Aniston, Alabama

1) Permission granted.

2) Not all of them. No. 3 is out of print. But \$3 (prepaid) will bring you all available ones if you write this month. Ed.

The Present Position Of The FCC On Its Year-Old Computer Inquiry

Just one year ago this week the Federal Communications Commission instituted an inquiry into the "Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities." FCC Commissioner Robert E. Lee said last week that responses to the inquiry have been encouraging, so encouraging that the Commission has postponed the date for filing responses until February 5, 1968.

Commissioner Lee presented the FCC's position on the marriage of computers and communications in an address to the National Association of Railroad and Utilities Commissioners. He noted in particular the increasing use of time-shared systems, and stated that time-sharing will "embrace in one form or another the communications industry."

The Commissioner raised the question of the common carriers' policies in leasing circuits to the computer industry. Western Union not only forwards messages, but also provides a data processing service. "What happens if a member of the computer industry seeks to embrace both activities?" Mr. Lee asked. "Will Western Union or even Bell make such circuits available?" He posed the question of what regulatory action would be called for if the circuits are not made available. The Commission may have to decide what the legitimate activity of the communications industry is.

Outlining the vast potential of time-shared services, Mr. Lee mentioned the concept of banking by phone, whereby the touch tone instrument can literally conduct transactions at remote locations. The prospect of a "checkless" or even "moneyless" society, and the whole new trend in business information utilities, will call for complete rethinking in the regulatory area.

The Commissioner described the upheaval computer technology has brought on education, medicine and business. With multiple access systems and services in the forefront, the Commission's decisions on public policy "may very well influence the future direction and thrust of multiple access computer systems."

It is in the interest of these policy decisions that the Commission instituted its inquiry. The areas to be explored are: the conditions under which on-line information and DP services should be subject to regulation under the Communications Act of 1934, whether computer services should be subject to regulation, and what legislation is needed to implement the policy decisions made; second, an assessment of the adequacy of the common carriers to meet present and foreseeable requirements; and third, how the security of personal and proprietary data transmitted over communications facilities may be protected.

Other evidence of FCC activity in this area came last week when Commissioner Nicholas Johnson asked for the establishment of an Office of Urban Communication to consider the needs of cities in communications regulation and to facilitate the exchange of information.

Educational Deduction Rules Liberalized

New rules which now govern education deductions have changed one of the awkward periods for computer professionals. Previously they stated that educational expenditures were not deductible if they involved a person specializing in part of his field, and so opened a new job or promotion to him. Under these rules, the motive of the person was immaterial - only the potential of the promotion was considered. And, under these rules, few computer people could qualify.

This has been abolished.

Under the new rules, Section 162-5 has been liberalized so that expenses are deductible so long as the education is of benefit to the taxpayer in his present position. The fact that they incidentally make him eligible for promotion is immaterial.

So: as attendance at seminars, etc. is considered educational - quite a lot of your expenses in going to professional meetings - such as the Fall Joint - are now deductible.

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Seminars On Care Of Mag Tape Scheduled

"The Care and Handling of Magnetic Tape for Computer Application" will be the subject of three seminars to be sponsored by the Ampex Corporation. Company authorities will discuss the topic in three cities. All of the seminars, which are open to the public at no charge, will run from 9 am until 2 pm.

Seminar locations are as follows: Cleveland, November 15, at Hollenden House; Detroit area, November 16, at the Holiday Inn in Southfield, Mich.; and Chicago, November 17 at the O'Hare Inn.

They Need Controls — But We Don't

ADAPSO Readies Its Case For Upcoming FCC Inquiry

ABINGDON, PA. — The ADAPSO stand on the FCC inquiry came out last week, and not unsurprisingly called for regulation to control the common carriers — while suggesting that no regulatory action was needed so far as data processing services in general were concerned.

The stand came as part of a major series of recommendations to the FCC, for its inquiry into the interdependence of the computer-common communication carrier industries, the data processing service center industry stated that the common communication carriers should not be permitted to market data processing and other electronic information services commercially unless they first affirmatively demonstrate to the FCC that their prices and terms of sale will not have the effect of injuring competition.

The industry posture, presented in a series of seven recommendations, was

approved by the Board of Directors of the industry's trade association, Association of Data Processing Service Organizations, Inc., (ADAPSO) and ratified by more than one hundred executives attending a regional management conference in San Francisco.

Amplifying on the first point, Salvatore Parisi, chairman of ADAPSO FCC Inquiry Committee and President of Tabulating and Data, Inc., of New York, indicated that with the initial exception, no present public benefit would be gained by the regulation of data processing and other electronic information services, whether time-shared or not.

The other six recommendations are technical and economic improvements including:

Service centers should be permitted to switch messages where such activity is incidental to a data processing service involved.

Users should be permitted to use non common carrier terminal or concentrator equipment which means appropriate standards on the dial-up network as well as on leased lines, without being required to utilize common carrier modulation and de-modulation equipment.

A need exists for a digital data transmission network providing data-conditioned line quality at low cost.

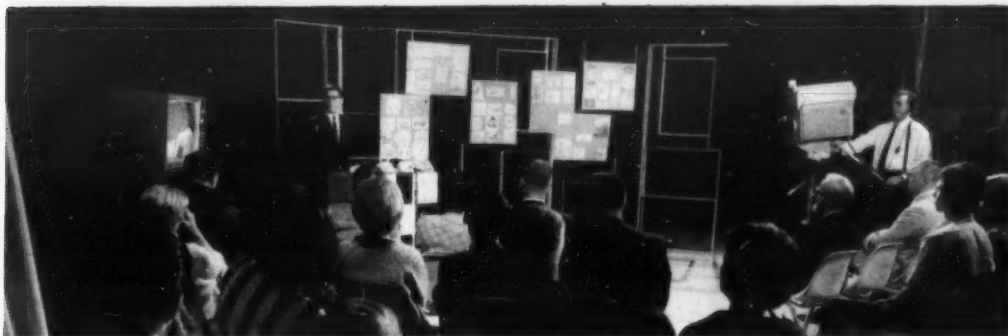
Additional tariff offerings should be presented by the common carrier, which provide a wider range of data transmission speeds.

The FCC should establish uniform equipment and line standards and charges, and recommend their adoption to the utilities commissions of the several states in an effort to insure the availability of all equipment or line offerings in all divisions of the various communications companies at the same time and at the same price, and to eliminate the disparities in certain states as compared with the identical facilities under inter-state tariffs.

Standard and reasonable charges for the cancellation of channel services should be established. On offerings where a cancellation charge is applicable, the amount of penalty should be clearly defined.

Supporting data is being prepared by ADAPSO legal and economic advisors and will be presented shortly to the FCC.

'The Computer Is The Message' Is The Message!



The philosophies of Marshall McLuhan and the versatility of third generation computers are linked in a televised demonstration staged last week for an adult education course and for possible later broadcast on the National Educational Television network. In the photo, Paul Hahn (senior systems programmer with URS Corp.) "converses" with a computer system in Los Angeles while simulating how a man in the future may dial his communal computer to assist him in daily, personal business. This possibility, technically possible now, may become normal practice soon. In the demonstration the computer

kept track of Kahn's bank balance and bills, current appointments, and on signal from the man paid his bills, computed his new bank balance, and made hotel and flight reservations for him for an appointment he had that evening. The computer responded to his queries with a 7772 Audio Response Unit which simulated the sound of a female human voice. The demonstration took place during an evening series on the philosophies of Marshall McLuhan at the College of San Mateo in Calif. URS Corporation and IBM Corporation donated both their technical time and equipment to the college for the demonstration.

I/Os Can Be Tested Without Shutting Down System

WHITE PLAINS, N.Y. — A program that allows input/output devices to be tested without shutting down an entire system is now available to IBM System/360 users.

The On-Line Test Executive Program (OLTEP) is a monitor program that controls on-line test routines for individual I/O units. Without interrupting normal operations, it can:

- determine the condition of I/O units;

- aid in making adjustments;
- exercise a malfunctioning I/O device to determine the cause of the malfunction; and
- verify a repair action prior to switching the device on-line.

OLTEP is designed to increase systems availability to the user. It can be run in a batch-only environment, or in the background partition of a multiprogramming system.

With Operating System/360 (OS/360), OLTEP requires no more

than 18,000 bytes of core storage for testing an individual unit. With Tape Operating System/360 (TOS/360) and Disk Operating System/360 (DOS/360), individual unit tests require no more than 10K of core storage. The remainder of core storage is available for normal operations during testing.

OLTEP is now available to OS/360 users. It will be available to DOS/360 users by November 15 and to TOS/360 users in the first quarter of the next year.

RPG Listing Aid For 360/20 Free From Computer Results

Computer Results Corporation announced the availability of an RPG Listing Aid for the S/360 Model 20. It provides a formatted listing of source programs with headings that quickly and easily identify all fields. It is said to facilitate debugging new programs before compilation, provide more readable program listing for backup or library purposes, and quickly generate duplicate listings for program changes. Multiple source programs may be obtained gratis by contacting Computer Results Corporation, 1680 Riverdale Road, West Springfield, Mass. 01089. Telephone 413-736-3613.

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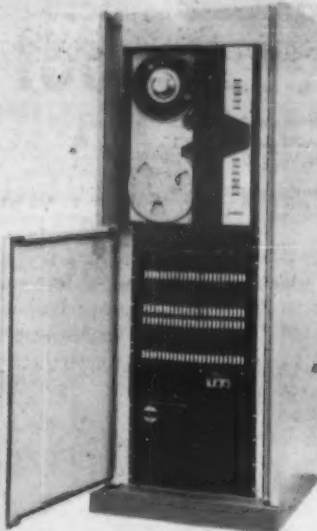


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The new Ampex buffered tape memory is said to be the first ever offered as a standard product.

Buffered Tape Units Delivered By Ampex

REDWOOD CITY, CALIF. — Ampex Corp. has begun delivery of the first line of buffered magnetic tape memories ever to be offered as standard products.

The new Ampex Models BTM-7, BTM-9, BTM-11 and BTM-12 are said to be priced significantly lower than previous, custom-made buffered tape memories. They offer the computer user a wide range of tape transport speeds, recording densities, transfer rates and core memory capacities.

Applications requiring buffered tape memories are found in industrial data processing areas, test-instrumentation facilities, data transmission terminals, radar sites, telemetry processing centers and research laboratories.

Flexibility of tape and core memory components enables the BTM models to produce computer-compatible taped data with continuous input rates from zero to 85,000 bytes per second (at 150 ips and 800 bpi with a 4,096-word core memory). Short term data transfer rates up to 500,000 bytes per second are achieved. Size of the data blocks may be varied from 12 bytes, the minimum computer-compatible length, to the maximum capacity of the core memory used — as high as 16,384 bytes.

The BTM models can record data in either 7-track or 9-track format, with vertical and longitudinal parity generated for both. Cyclic redundancy characters are recorded in the 9-track format.

The Ampex line of buffered tape memories ranges in price from approximately \$27,000 to \$40,000.

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Leased Fortran Assembler Offered For PDPs Info Controls Claims Faster Execution

A new FORTRAN Assembly package makes the PDP-8, -8S, and -5 easier to program. The Extended FORTRAN II Program, developed by Information Control Systems, Inc., provides program execution up to 4 times as fast as other compilers available for the PDP-8 series. Special input and output statements are provided to give FORTRAN the capability to handle real-time and process control applications. A true compiler concept eliminates execution time interpretative operations.

The package, which leases at \$3,500 on a 10-year basis, includes program manual, tape, indoctrination seminar

and the ALICS II Assembler, developed as a preparatory system for the small computer system user. Automatic paging is featured in this machine-level language which was written by ICS to help companies in the programming of real-time systems. ALICS II leases at \$1,500 on a 10-year basis.

Information Control Systems, Inc., located in Ann Arbor, Mich., specializes in real-time systems. The rapidly expanding company grew out of the thesis projects of University of Michigan Ph.D. candidates Chuck Newman and Dave Carlson. The business is now growing from one half-million to one million annually.

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To do this, ACM publishes three technical publications. It has more than 15 Special Interest Committees or Groups for those concerned with specific computing areas. ACM sponsors technical seminars and meetings at local, regional and national levels. It

provides nationally known lecturers to the 150 ACM chapters distributed across the country. It offers quick answers to technical inquiries from its members. A professional development program helps widen members' educations.

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SOFTWARE — Bargains For Small Users, Too!

Hardware Needed, But . . .

The hardware may be necessary — but the software controls the efficiency of the hardware. That appears to be the message which more and more data processing managers are getting now-a-days. In the Fall Joint, software will be getting full attention in the papers — and on the exhibit floor. This attention has been late in coming, because of the problems involved in the software itself, because of the consistent under-estimation of its importance, and because of the industry structure which has still been basically geared to giving it away 'free'.

Now, software is getting the attention it needs, and you will find it simple to survey — at the FJCC!

CSC Tackles Largest Conversion Market Exodus II Announced For 1401 To 360

EL SEGUNDO, CALIF. — Computer Sciences Corporation, building on their experience with the 1410-to-360 conversion program EXODUS, have now decided to go after the much larger 1401-to-360 conversion market. This time they have collaborated with the Boise-Cascade programmers who write Exodus so as to avoid some of the problems which were encountered in the original program. Exodus has many successful conversions to its credit — but there have been some

failures also. This has occurred when the object time performance has not come up to expectations — and has been used to suggest ways to build a better program.

The new program has now been built, and tested. The resulting codes run under the normal operating systems on the 360; and CSC expects them to run with good object time performance.

Planning For Exodus II

In preparing for the new system 1401 coding from many installations was examined, and some very different coding practices were allowed for.

The BBE (Branch on Bit Equal) instruction, for instance, turned out to be one which many programmers never used — but which some used a great deal. This was therefore allowed for in the planning of Exodus II.

\$9,000 Price

Charles Sullivan, of CSC, told COMPUTERWORLD this week that object program efficiency was 'the name of the game'. If a client was not satisfied with the resulting program times — then there was no sale. Selling was to be as simple as that. Prices for the system for single installations will be \$9,000, with special provisions being available for purchasers with multiple machines.

Exodus II converts IBM 1401 Autocoder and Symbolic Programming System to 360 Basic Assembly Language (BAL). The new product, which is written in 360 BAL, translates and executes programs for operation under either the Disk Operating System (DOS) or Operating System (OS).

Exodus II requires a low core capacity and only two machine passes. The new system produces a one-to-one translation which retains all the original program logic at speeds equivalent to the original Autocoder assembly time on the 1401.

The new product prints out a statement-by-statement analysis of each 1401 instruction alongside its counterpart IBM 360 BAL instruction. A diagnostic message focuses attention on those 1401 instructions for which a comparable IBM 360 instruction cannot be generated.

Exodus II utilizes an extensive library of IBM 360 macro instructions and routines. These simulate 1401 coding such as editing, indexing and arithmetic functions which are not translatable on a direct basis. These routines also eliminate the need for 1401 compatibility, thus enabling IBM 360 users to utilize such benefits as multiprogramming, teleprocessing and spooling (simultaneous peripheral operations on-line).

Over A Hundred File IV Management Systems

Informatics will be showing their Mark IV File Management System which runs on the 360, as any other DOS or OS job. The Mark IV is a general purpose system which provides efficient day-to-day operation, yet allows quick response for urgent one-time requirements. The programming task is simplified through the use of special forms which are filled out to define the task. Informatics claim that the time involved in this is much less than time which would be required even with high-level languages such as COBOL.

To simplify matters, the forms do not need to be completely filled out. Instead, if blanks are left, purposely or not, system parameters will be used. As many of the common data-processing tasks are already pre-coded in Mark IV, the amount of coding needed is greatly reduced.

Mark IV when executed as a normal DOS or OS/360 job reads the source input and edits and verifies the entries. If all edits and checks are successful, it proceeds to select the appropriate program modules and subroutines from its library, generate a complete program to accomplish the specified functions, and execute the generated program which produces the desired results.

If the results are required on a daily or weekly basis, the user may instruct Mark IV to save the edited instructions. When the repeat run is made, Mark IV retrieves the saved instructions from its catalog. New requirements may be incorporated at this time and an augmented program generated and executed.

Over a hundred installations have contracted for the Mark IV File Management System, and there is an active users group in existence.

Selected Software Papers at the FJCC

Tuesday

Whither Programming Languages?

The panel will discuss the future of programming languages, giving consideration to the question of how development should proceed as well as the question of what actual trends are.

EXECUTIVE CONTROL PROGRAMS

The major problem facing a designer of a real-time or time-shared system lies in the specification of the control program. Choices must be made as to the most appropriate techniques for scheduling the system's various activities, for insuring protection against program and equipment failure, and for providing suitable man-machine interaction environment.

MANAGEMENT OF PERIODIC OPERATIONS IN A REAL-TIME COMPUTATION SYSTEM

The management of real-time control programs in many of today's computation systems, especially those for avionics or space applications, presents the problems of obtaining precisely periodic scheduling and obtaining fresh sensor data.

A GENERALIZED SUPERVISOR FOR A TIME-SHARED OPERATING SYSTEM

An operating system is considered to be a set of programs and routines which provide an environment within which its users may effectively command the facilities of one or more central processors. This environment allows time-shared multiple access to the facilities administered by the operating system, providing apparent simultaneous availability of these facilities to a large number of users.

The design of a generalized machine-independent Supervisor for such a multi-programmed operating system is presented.

A REAL TIME EXECUTIVE SYSTEM FOR MANNED SPACEFLIGHT

The Real Time Executive Control System discussed in this paper, was the foundation for the applications programs developed in support of NASA's Gemini and early Apollo missions.

EXECUTIVE PROGRAMS FOR THE LACONIQ TIME-SHARED RETRIEVAL MONITOR

The system organization for LACONIQ, a time-sharing monitor designed for information processing via on-line dialogues, is described as currently implemented on an IBM 360/30 computer.

AN EXECUTIVE SYSTEM FOR ON-LINE PROGRAMMING ON A SMALL SCALE SYSTEM

This paper describes features and capabilities of an Executive Control Program.

Wednesday

Digital Simulation Languages and Systems

One of simulation's most intriguing and profitable uses is in the design, analysis and evaluation of hardware and software systems.

AN APPROACH TO THE SIMULATION OF TIME-SHARING SYSTEMS

The promise to alleviate many of the problems exhibited by existing time-sharing systems has generated a great interest in some of the new third generation systems.

EXPERIMENTS IN SOFTWARE MODELING

This paper will present a summary of several experiments which were conducted to explore the feasibility of using a performance model of proposed software to make design decisions about that software.

DESIGN, THRU SIMULATION, OF A MULTIPLE-ACCESS INFORMATION SYSTEM

The simultaneous usage of multiple terminals on-line with a central information processor that is dedicated to performing a limited set of functions, characterizes a special purpose type of time-sharing system which is applicable in a number of areas.

SODAS AND A METHODOLOGY FOR SYSTEM DESIGN

This paper presents a methodology for designing systems, and a computer language which is an important aid in applying that methodology.

New Developments In Programming Systems

This session offers five recent confrontations with old problems of programming: the representation of programs and data, and the testing, modification and use of such representations.

ANOTHER LOOK AT DATA

Although one of the more troublesome areas in language and system design concerns data description and handling, surprisingly little work has been devoted to gaining a better understanding of the nature of data.

DATALESS PROGRAMMING

A programmer using existing programming languages almost always encounters difficulties because he has to choose a data representation before coding a problem. The Dataless Programming System is designed to alleviate these difficulties.

PLANIT: A FLEXIBLE LANGUAGE DESIGNED FOR COMPUTER-HUMAN INTERACTION

This paper discusses a new programming language, PLANIT, designed to handle problems encountered in using time-sharing systems.

A FORMAL SYSTEM FOR THE SPECIFICATION OF THE SYNTAX AND TRANSLATION OF COMPUTER LANGUAGES

This paper presents two basic results: the use of established methods of recursive definition to present a single method to

1. specify the syntax of computer languages (including context-sensitive requirements, such as the restrictions implied by declaration statements).
2. specify the translation of programs in one computer language into programs in another language.

GENERALIZED TRANSLATION OF PROGRAMMING LANGUAGES

The linguistic theory of transformational grammars defines a system which is sufficiently powerful and elegant not only for the description of natural languages but artificial ones as well.

Proprietary Protection of Computer Programs

With the emergence of the software industry, the problem of proprietary protection of programs has increased.

Thursday

The Graphic Processor In Programming Systems

The use of on-line graphics in a stand-alone system for a large class of applications — particularly in the area of design automation — is an accepted fact. Attempts to marry graphics and time-sharing pose a set of problems that are of major import to the system designer.

MULTI-FUNCTION GRAPHICS FOR A LARGE COMPUTER SYSTEM

A modern large scale computer facility should provide a variety of graphical services to its customers.

A GRAPHIC TABLET DISPLAY FOR USE UNDER TIME-SHARING

The problems of using highly interactive graphic consoles with a time-shared processor are discussed in this paper.

REACTIVE DISPLAYS: IMPROVING MAN-MACHINE GRAPHICAL COMMUNICATION

The growing importance of computer graphics requires improved techniques for man-machine communication and graphic data management.

GRAPHIC LANGUAGE TRANSLATION WITH A LANGUAGE INDEPENDENT PROCESSOR

Computerized graphic display systems and associated software packages have proliferated in the past four years. This paper describes a system which can be tailored to a broad class of applications.

The Fall Joint Is The Place To Find Hardware

The computer industry is based on hardware - and hardware is coming in many more different sizes and shapes this year. As the computer system spreads, so do the number of types of units, and the data processing manager needs to know about them all.

As the computer industry matures, so does the industry's capacity to offer a wider choice to the data processing manager. No longer is the choice just between main frame manufacturers - many other good firms are now offering choices for peripherals, for remotes, and for various parts of the system. And so the maturing data processing manager faces further decisions which he is called on to make.

The advantage of a conference such as the Fall Joint is that many sources of information can be cross-checked against each other. The papers, with their research and practical aspects. The exhibits, with their sometimes overzealous salesmen. And crowds themselves, with their tales of success - and of woe. Each an invaluable source of information - which, properly correlated inside nature's own computer, will help the DP manager with his problems.

Come to the Fall Joint!

HARDWARE — Cost & Performance

7044/7094 Programs To Be Run On Stand

The IC-6000 computer, new from Standard Computer Corporation, will have its first prolonged public display at the Fall Joint Computer Conference. The computer is designed to offer program emulators for many systems, representing a new approach to the conversion problem. The IC-6000 runs a variety of different programs for the IBM 7094 and 7044 computers, all of them direct from other machines and running on the IC-6000 without reprogramming.



Standard's 20 tape system installed at the Los Angeles office of dataStation, a service center.



Something must be going right! Roger T. Hughes, president of dataStation.

400 Family Extends Downwards

GE 405 On Show: Growth Potential Emphasized

PHOENIX, ARIZ. - The GE-405, latest and smallest member of the GE 400 family, will be on display at the

FJCC. Both hardware and software for the new computer afford exceptional growth potential to the user.

As the user needs more memory or

faster processor speeds, he may move upward to larger members of the 400 series. If his plans include time-sharing, he may even move to the new GE-420 Time-Sharing System.

Programs produced for any of the 400's are fully operational on larger systems in the family. Reprogramming problems are thus eliminated, and software development costs may be amortized over a longer period of time.

With a memory capacity of 8,000 words and an access speed of 2 microseconds, the GE 405 leases for approximately \$5,120 a month and sells for about \$196,420. Availability is 4 months, with first deliveries scheduled for February, 1968.



Electronic Memories Brings Out Four Systems

HAWTHORNE, CALIF. - To be introduced for the first time at the Fall Joint Computer Conference are four new memory systems from Electronic Memories.

A compact, 900 nanosecond 2-1/2D core memory system and the complementary 650 nanosecond Nanomemory Model 2650 will be demonstrated. The

new system, Nanomemory 2900, has a cycle time of 900 nanoseconds and an access time of 400 nanoseconds. It can handle up to 16,384 words x 18 bits, 8,192 words x 36 bits or 4,096 words x 36 bits without modification of the 7"x19"x21" configuration.

The Nanomemory 2650 with a cycle time of 650 nanoseconds and an

access time of 350 nanoseconds, is also packaged in a 7" high sliding drawer. Its high speed and compact size make it suitable for applications where high reliability and simplified maintenance are required.

For applications requiring small amounts of digital storage at a low price, the company will introduce Micromemory 1000, which has storage capacities of from 512 to 4,096 words of 8 bits. It has a 2.5 microsecond cycle time and an access time of 0.9 microseconds. The system, which costs \$3,000, uses integrated TTL circuits and requires no special circuit components. Its total size is 400 cubic inches.

Designed for rugged ground-base and shipboard digital storage applications is SEMS 7 (Severe Environment Memory Series), a militarized core memory system.

On-Line Programming Unit - \$3,200

Conversational Mode Terminals From Friden

SAN LEANDRO, CALIF. - Friden will show its Model 504 Photoelectric Keyboard and Model 7100 Conversational Mode Terminal at FJCC.

Time-Sharing Terminals

The 7100 Terminal is designed for use in time-shared computer systems of all types and may be used for on-line programming, information retrieval, documentation and scientific analysis. The self-contained unit incorporates the USACH language and operates at 12.2 characters per second. It is priced at \$3,200.

Photoelectric Keyboard

The Model 504 Keyboard generates the full 8-bit USACH code with no external circuitry. Its multiple channel construction permits complex coding

arrangements according to user specifications. The unit provides coded data entry for any digital code-operated device and can be connected to special computer input/output stations, teletype systems, tape punches, information retrieval systems and display units.

EAI 8400 II To Be Introduced At FJCC Memory Protection & 25% Faster Speed

WEST LONG BRANCH, N.J. - A scientific digital computing system - featuring 25 per cent faster instruction execution times and memory protection - will be introduced by Electronic Associates, Inc. at the 1967 Fall Joint Computer Conference.

The new general-purpose computing system, designated the EAI 8400 MOD II, will be exhibited along with the recently introduced EAI 580 Desk-Top Analog/Hybrid Computing System, the EAI 690 Hybrid Computing System and the EAI 3500 Dataplotter.

Tuesday

Advanced Computer Generated Graphics

This session explores the advances made in generating graphic designs by computer. The session is principally devoted to software actually implemented with emphasis on practical industrial applications.

The four papers describe the programming solutions to the problems encountered in generating graphics. These problems range from eliminating hidden surfaces in perspective projections of three dimensional objects to overcoming the inherent jitter associated with data plotting in a motion picture atmosphere.

TEXTILE GRAPHICS APPLIED TO TEXTILE PRINTING

This paper describes the application of Textile Graphics to textile printing. This new application - to textile printing - differs from applications to other forms of textile design because the printed textile design is applied after the textile is fabricated.

First, the major current methods of producing printed textile designs are presented. Then, the types of designs are analyzed and reclassified to give more insight into new methods of obtaining color separations.

HOLOGRAPHIC DISPLAY OF DIGITAL IMAGES

The use of computers in the construction of holograms and the reconstruction of images from holograms has been inhibited by the massive task involved in the straightforward calculation of the integrals of Kirchhoff's diffraction theory. The recent development of a fast finite Fourier transform algorithm has made possible the economical calculation of large-scale holograms.

Holograms having 4×10^4 resolution elements have been digitally constructed from numerically defined transmittance functions (objects) having 10^4 resolution elements.

HALF-TONE PERSPECTIVE DRAWINGS BY COMPUTER

This paper is a brief description of an algorithm for the creation of two-dimensional, half-tone pictures of perspective projections of three-dimensional objects. Only the visible surfaces are displayed; all hidden surfaces are erased. This process is independent of the orientation of the object. The inclusion of half-tone shading was considered important because the illumination of an object gives a viewer much information about the three-dimensionality of the object.

VISTA, COMPUTED MOTION PICTURES FOR SPACE RESEARCH

The capability of viewing the relative position and orientation of orbiting spacecrafts together with their detailed relationship to the Earth has been developed in a computer generated display system named VISTA (Visual Information for Scientific Telemetry Analysis).

Display Systems and Equipment

This session is organized to present to information processing specialists some of the latest concepts and capabilities in information display. To this end two papers are included which cover the spectrum of performance and equipment available in console and large screen displays. Two additional papers deal in more detail with specific examples of systems and equipment in these categories.

Performance Stressed By Vendors

Standard System



President of Standard Computer Corporation.

Tymshare Runs FJCC Plotter From LA Center

Visitors to the Fall Joint Computer Conference will be able to create graphic designs to order by tapping into a time-sharing computer from the remote terminal facilities of Tymshare, Inc.

The remote plotter and teletype terminal combination will be connected on-line to the Tymshare computer center in Los Angeles.

The plotting system, including controller and drum plotter, was designed by Calcomp specifically for a time-sharing environment. The 210 Controller will direct the data traffic between computer, teletype and plotter. A series 500 incremental drum plotter produces pen-and-ink graphics within seconds after keyboard input. The plotter moves in precise increments, accurate within fractions of an inch, and produces pictorial output at the rate of 280 points per second.

SDS Multi-Programs Real-Time T-S

LOS ANGELES, CALIF. - Scientific Data Systems will demonstrate its Sigma 7 computer and SDS 940 time-sharing system at the FJCC.

Featured in the Sigma 7 demonstration will be the first public showing of the SDS Rapid Access Data file, which stores up to 3-million bytes and has an average access time of 17-milliseconds. Several batch processing jobs will run simultaneously with two real-time problems during the demonstration. All the programs will be under the control of the Batch Processing Monitor which controls the multi-use, real time Sigma 7.

For the time-sharing demonstration, four Teletype terminals will be linked to an SDS 940 near El Segundo, Calif. Visitors may use the 940 remote terminals to solve problems in BASIC, FORTRAN or other languages available with the 940 system.

Tongue-In-Cheek Department?

A recent conversation with several high-ranking AFIPS officials revealed that, although attendance at the SJCC had been record-breaking, a significant number of programmers were deliberately staying away. This was attributed to the small number of telephones at the Convention Center, and the attendant difficulty for programmers to reach their stockbrokers.

In recognition of this problem, Programmatic, Inc. has arranged with Scantlin Electronics, Inc. to have a QUOTRON unit placed in the Programmatic booth at FJCC. The company hopes that the QUOTRON unit will not detract too seriously from Programmatic's own display of Hexamatic/16, its own vest-pocket-size computer.

See Us At
Booth 704A

Linked Booths Mark Mohawk's Anelex Merger

HERKIMER, N.Y. - Recently merged Anelex Corp. and Mohawk Data Sciences Corp. will link their separate exhibits at the FJCC with an operational data transmission and print-out system. Transmission will originate through a Mohawk 703 Buffered Tape Unit in the Anelex booth. A Mohawk 1103 LDC Data-Recorder and 1326 Buffered Line printer in the MDS booth will receive the transmitted data and provide printed copy.

MDS will also display its 1101 Data-Recorder, basic unit in the company's Data-Recorder line.

GRAPHIC CRT TERMINALS - CHARACTERISTICS OF COMMERCIALLY AVAILABLE EQUIPMENT

"Who needs another review of Graphic CRT Terminals when so many good ones have recently been published?" The justification depends on several factors... a need for user-oriented, hardware based information, and the need to define terms.

A typical block diagram for a Graphic CRT Terminal is presented and discussed in some detail, with emphasis given to configuration of commercially available units.

HOW DO WE STAND ON THE BIG BOARD?

There are circumstances determined by such factors as audience size, type of information, and its applications where the use of a large scale display is dictated. Currently available techniques for the generation of large-scale displays are: rapid process film systems, scribing techniques, light valves and projection cathode ray tubes. This paper will present a brief discussion of the concepts underlying these display systems and will also briefly discuss their comparative performance. It is intended to acquaint the listener with the current display state of the art.

THE CRT DISPLAY SUBSYSTEM OF THE IBM 1500 INSTRUCTIONAL SYSTEM

The IBM 1500 CRT Display Subsystem controls 32 independent computer-programmed instructional displays. The lesson images may include text or graphic illustrations, or both, on many subjects, in any format. Characters are generated by hardware, but may be selected on-line from any number of user-specified fonts, which can be changed at electronic speed.

CONIC DISPLAY GENERATOR USING MULTIPLYING DIGITAL/ANALOG DECODERS

A computer-driven display generator is in operation at M.I.T. Lincoln Laboratory, having the capability of drawing parabolas, ellipses, circles, hyperbolas, as well as points and lines. A wideband two-quadrant multiplying decoder was designed as the basic component for this hybrid display generator. Conic sections are generated by forming the ratio of two parametric second degree polynomials. The drawing rate is high enough to enable the generator to simultaneously service several CRT's; resolution is one part in one thousand.

Management Information Systems

Management's problem at any time is to make good decisions and to choose between alternatives, often when there is a shortage of good information on which to base decisions. The goal of Management Information Systems is to provide the information which management needs to improve its decision-making process.

This session will present evidence that the required technology in systems knowledge, hardware and software is available to meet management's information requirements. Economic, organizational, and perhaps psychological problems are the chief impediments to success in applying this technology.

ON DESIGNING GENERALIZED FILE RECORDS FOR MANAGEMENT INFORMATION SYSTEMS

This paper analyzes the logical components of a record and puts them in a context that permits the design of a file record which can be mathematically optimized.

THE PLANNING NETWORK AS A BASIS FOR RESOURCE ALLOCATION, COST PLANNING AND PROJECT PROFITABILITY ASSESSMENT

The paper describes how basic network planning techniques can be supplemented for the purpose of improving the utilization of resources in order to minimize cost and also to assist in the making of project profitability assessments.

Wednesday

Memory System Technology

The papers in this session describe important memory structures ranging from mature designs which are or are close to being placed into large scale service, to those developments in the category of being highly promising for future systems.

THE B8500 HALF-MICROSECOND THIN FILM MEMORY

The main memory in the B8500 Modular Processor consists of up to 16 memory modules each with a capacity of 16k words, 52 bits and operates with a half microsecond cycle. The stores utilize magnetic flat films deposited in arrays of discrete spots on thin glass substrates. Sandwicheing of conductors between two substrates provides partial coupling to film pairs. A memory frame provides storage for 4k words, 52 bits and forms a pluggable unit with the associated circuitry necessary for its operation. Four frames are interconnected at logic levels and share the control circuitry, the information and the address registers. The memory circuits are constructed in hybrid form and the logic functions are performed by CTAL microcircuits.

BIT ACCESS PROBLEMS IN 2-1/2D 2-WIRE MEMORIES

Two difficult problems associated with 2-1/2D 2-wire memories are considered; the design of an economic bit access, and the minimization of bit current noise.

ENGINEERING DESIGN OF A MASS RANDOM ACCESS PLATED WIRE MEMORY

A plated wire mass store of 10⁸-bit capacity is described. The major reason behind such a development is the potential low production cost. The basic memory module consists of 10⁷ bits, and the mechanical package can hold ten modules. Potential cycle time of the memory is 1-2 microseconds.

In addition to making use of the NDRO property of the plated wire to reduce the circuit count, stack design has emphasized simplicity and ease of fabrication.

A NEW TECHNIQUE FOR REMOVABLE MEDIA READ-ONLY MEMORIES

The objective of this paper is to establish a set of design goals for a removable media, central processor, read-only memory and to propose a new technique for the implementation of a memory satisfying these design goals.

LOW POWER COMPUTER MEMORY SYSTEM

The need for reduced power dissipation in aerospace computer memories motivated the development of the 1024 word 30 bit MOS integrated circuit memory described in this paper. The memory is NDRO, has a 1-microsecond read or write cycle time and dissipates a total of 3.5 watts. Primary emphasis is given to the techniques employed to minimize power dissipation in both the MOS memory store and the bipolar peripheral circuits. Power requirements of the subsystems, and overall memory performance are briefly discussed.

Main Frame Memory Technology

This session will encompass a presentation and debate by three magnetic and three semiconductor memory experts on the technology most likely to be used in the next generation of main frame memories. The six members of the panel will debate the relative merits of their chosen technology, and attempt to abstract a conclusion. Detailed discussions between all the panel members will take place after the position of each one has been established. Participation will be opened to others in a follow-on session in the evening where all panel members will again be present.

Techniques to Facilitate Conversion to New Machines

The panelists, representing both manufacturers and major users, will discuss approaches to systems conversion. "Standardization" of language via a high degree of machine independence will be cast in the light of the absence of standards between manufacturers. The panel will focus on recommendations for a direction for the future - principally in calling attention to primary criteria to be used by the manufacturer in designing his machine system to be software compatible with the systems he is attempting to replace.

Thursday

The Impact of New Technology on the Analog/Hybrid Art - I

Present day hybrid systems are characterized by increasingly sophisticated software requirements. The first attempts at creation of useful analog-digital computer systems were faced with a multitude of hardware problems associated with communication between discrete and sequential machines on the one hand and continuous and parallel machines on the other. Now, however, since the hardware marriage has been successfully consummated, a multitude of software problems remain. This panel will concentrate on the most important of these problems.

The Impact of New Technology on the Analog/Hybrid Art - II

The presentation will open with a discussion of the hardware aspects of relevant digital devices, both as they currently exist and, within limitations of proprietary interests, what can be expected in the future. Next, the question of communicating with a computer will be examined from a systems standpoint, taking cognizance of both software and hardware innovations. Concluding the formal presentation will be two speculations, from current analog/hybrid practitioners, as to the future of their art.

Hardware In The Conference

IDIOM From Info Displays

Buffered CRT Display Unveiled

Information Displays, Inc. will exhibit for the first time its fully-buffered Graphic CRT Display System, IDIOM, at the Fall Joint Computer Conference in Anaheim. IDIOM may be used as a free standing display or may be connected directly or remotely to almost any modern digital computer.

IDIOM (Information Displays, Inc. Input-Output Machine) has a programmable, expandable, 4096 X 16 bit, random access memory. It is suited to

such applications as computer-aided design, simulation, on-line process control, computer-aided instruction, management information, command and control, information retrieval, human factor studies and medical research.

Demonstrated at FJCC will be IDIOM's capacity to create, modify, edit and store display files without the aid of an external computer. Light pen tracking, display scaling, image rotation, and other display file manipulations will also be demonstrated.

As Well As The Papers . . .

A Conference is not made up of afternoon — (except while the papers alone. The excitement of meeting others in the industry, the special programs for the ladies, even the sometimes garish and noisy exhibition areas, are all necessary parts of the proceedings.

At Anaheim all these will be present. The Exhibition Area opens at 11 am on Tuesday, and practically stays open until Thursday

named American Society of Information Science which was lately called American Documentation Institute) have sponsored meetings on the Friday so as to reduce people's travel costs. There is something for everyone — and it will be well worth going to. of societies (including ACM, Simulation Councils and the newly See you at the Fall Joint!

\$16,500 Computer

HP 2115A Has 4K Fortran, 8K Algol

PALO ALTO, CALIF. — A new compact general purpose digital computer from Hewlett-Packard will be demonstrated for the first time at the Fall Joint Computer Conference. The computer has 4K memory (8K alternately available), 16-bit word and 2-microsecond cycle-time. It is priced at \$16,500 with Teleprinter.

Basic input/output structure of the Model 2115A is 8 channels, each with automatic priority interrupt. A set of software already in existence for a larger HP computer includes a 4K extended ASA Basic FORTRAN compiler and an 8K configuration ALGOL.

Additional equipment to expand the power and versatility of the computer is available on a plug-in basis and includes disc memory, direct memory access, and an extended arithmetic unit that reduces multiply and divide time,

Mark Reader For Remote Sites

ALO ALTO, CALIF. — "Smaller than a telephone booth and cheaper than a Cadillac" is what Hewlett-Packard thinks a practical optical mark reader should be. Their new Optical Mark



Hewlett-Packard Optical Mark Reader can be used at remote sites, and the data sent in by data-phone.

will operate in such environments as construction sites, machine shops, weather stations, and other locations where vibration, temperature or humidity may be problems.

The reader will directly read pencil marks (and/or punches) on standard tab cards into any data system compatible with Dataphone. Preprinted marking boxes will accept 39 characters of alphanumeric information on each card. Standard reading rate is 105 characters per second, 10 characters per second rate is optional, but available to match the Bell System 103A.

Lenkurt Shows Data Transmission Systems

ANAHEIM, CALIF. — On display at FJCC will be two data transmission systems from Lenkurt Electric Co., Inc.

The 25A Data Transmission System, available in three versions, operates over a 4kHz voice circuit. Options available include 7 channels at 200 bits per second, 16 channels at 110 bits per second and 24 channels at 75 bits per second.

MANAGER

PERIPHERAL EQUIPMENT ENGINEERING

\$18,000 to \$22,000

Systems innovator to direct the design, development and release-to-manufacture of all peripheral sub-systems, (I/O options, displays, etc.) associated with a general purpose I/C computer family. Technical innovation and business orientation are important. There are particularly attractive aspects to this situation we will be glad to discuss with you. New England location.

If you are interested in exploring this opportunity, please contact:

John D. Devereux

Starrett Associates, Inc.

— management consultants —

594 Marrett Rd., (617) 862-8622, Lexington, Mass. 02173

The Exhibitors

| EXHIBITOR | BOOTH NUMBER(S) | Kennedy Company | 1416 |
|--------------------------------------|-------------------|--|-------------------|
| Adage, Inc. | 401-402 | Kleinschmidt Div., SCM Corp. | 315-316 |
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| Business Supplies Corp. of America | 1431-1432 | The National Cash Register Co. | E |
| | | North American Aviation, Inc./ | |
| | | Autonetics Div. | 209A-209B |
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| Computer Design Publishing Corp. | 230 | Raytheon Co. | 210-211 |
| Computer Sciences Corp. | 1001-1002 | Raytheon Computer | 601-604 |
| Computer Test Corp. | 1505-1506 | RCA Electronic Components & Devices | 118-119 |
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| Fairchild Semiconductor | 501-502 | Trans-Controls, Inc. | 1430A |
| Ferroxcube Corp. | 104-106 | Transistor Electronics Corp. | 503-504 |
| Friden, Inc. | 116-117 | Tyshare, Inc. | 102-103 |
| | | | |
| General Computers, Inc. | 229 | UNIVAC | F |
| General Electric Information | | University Computing Co. | 306A |
| Systems Marketing | C1-C6 & 1007-1012 | Uptime Corp. | 805-806 |
| General Kinetics Inc. | 153-153A | URS Corp. | 1404 |
| Geo Space Corp. | 1502-1504 | J.S. Magnetic Tape Co. | C7 |
| The Gerber Scientific Instrument Co. | 1101-1106 | | |
| | | Varian Data Machines | 219-221 |
| Hewlett-Packard Co. | 705-707 | Vermont Research Corp. | 154-155 |
| Holt, Rinehart and Winston | 152 | | |
| Honeywell, Computer Control Div. | 1107-1112 | Western Telematic Inc. | 205-206 |
| Houston Omnigraphic Corp. | 703-704 | The Western Union Co. | 1309-1310 |
| | | John Wiley & Sons, Inc. | 1419 |
| | | Wyle Laboratories Products Div. | 137 |
| IBM Corp. | B | | |
| Informatics Inc. | 107 | Xerox Corp. | 201-203 |
| Information Control Corp. | 1424 | | |
| Information Displays, Inc. | 134-135 | Zeltex, Inc. | 1412-1413 |
| Interdata | 130-131 | | |

How The IBM Photo-Digital Computer Memory System Works

SAN JOSE, CALIF.—The new IBM Photo-Digital Storage System recently installed at Livermore, has more than a trillion data-bits under automatic control. This requires very high density storage.

In the photo-digital system, this requirement is met by using a concentrated beam of electrons to record data on high-resolution silver-halide film. This combination allows the data bits to be closely packed both vertically and horizontally on the film chips.

The electron beam emanates from tiny replaceable tungsten filaments in the turret of an electron gun. The stream of electrons is focused and positioned as it travels through a column of lens and deflecting plates to the target. At the surface of the target, the beam is approximately 1.25 microns in diameter at 5×10^{-9} amperes. Feedback control systems automatically monitor and correct deviations in filament brightness, beam alignment, spot size, and current. These automatic servomechanisms operate by special electronics in the recorder.

To record data, a blank chip is removed from its cell and placed in a high-vacuum chamber on the axis of the electron beam column by a rotary chip transport device. The chip is formatted into 32 frames, and data is recorded a frame at a time at a rate of more than 1/2 million bits per second. As the beam sweeps across a frame, it "paints" a dark spot on the film, consisting of a number of vertical lines, and produces a clear spot by leaving an unmarked space. A combination of one clear and one dark spot corresponds to a binary "0", and its opposite (dark followed by clear) represents a binary "1". Either combination corresponds to one data bit.

Approximately 5 million data bits can be stored in this manner on the 1.3 by 2.7 inch chip, which provides



WORLD'S LARGEST COMPUTER STORAGE DEVICE: This mass storage and retrieval system holds a trillion bits of data for computer processing. The data is stored in files of stacked trays resembling egg crates.

more than 15,000 addressable lines of data.

Recorded film chips are moved to the "On-line" film developing station in the recorder by the chip-transport mechanism. The chip enters one of the cavities of the rotary processing turret at the load-unload station and rotates automatically through a sequence of developing, stopping, fixing, washing, and drying stages.

Each chip is treated individually by the introduction into each cavity of metered amounts of chemicals, wash water, and air. Up to eight chips are processed at one time. To achieve a high degree of consistency during processing, each chip receives a fresh supply of chemicals and wash water, and all materials entering the cavities are carefully temperature controlled. Chips are developed to archival quality.

The Livermore photo-digital system stores more than 11,000 cells in three

body of the cell is composed of a different plastic, selected to give the cell dimensional stability. Slots in the side walls hold the chips apart inside the cell.

The file address of all records, stored by the system, is maintained in an index by a separate computer. At the request of the computer, any cell in the file can be accessed and delivered through the low-pressure, high-flow pneumatic channel to the appropriate station for reading.

Cells are stored in individual compartments within movable trays stacked in a cubic arrangement. The 450 compartments in each tray are divided into sections, each containing a row of empty compartments.

An individual cell is withdrawn from any location in the file by positioning the trays to form a vertical column of empty compartments above the requested cell. This passageway through the trays is aligned with the main transport tube in the system by means of switching devices at the top of the file. The cell is then lifted pneumatically through the shaft and delivered to the appropriate station. A similar method is used to return a cell to the file. The trays are aligned and the cell, in this case, is blown through the open column into the storage compartment.

The movable cell concept and pneumatic transport system introduce a materials handling method which allows the storage capacity to be easily

expanded without requiring additional read/write equipment.

Recorded chips are read at one of two readers in the Livermore photo-digital system at the rate of more than 2 1/2 million bits per second. At the read station, the requested chip is picked from the cell and accurately positioned by pressurized air bearings in the optical path of a cathode ray tube flying spot scanner. This moving spot of light, produced by the CRT, is captured and held on a line of data by a feedback technique.

As the scanner moves back and forth across the data lines, the beam of light is transmitted through a clear spot on the chip and blocked by a dark spot. A photomultiplier behind the chip senses and amplifies the transmitted light pattern, and electronic

Continued on Page 11

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| KEY PUNCHES | 024, 026, 029 |
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| OPTICAL READERS | 1282 |
| CALCULATING PUNCHES | 602A |
| REPRODUCING PUNCHES | 514, 519 |
| ACCOUNTING MACHINES | 403, 407, 408 |
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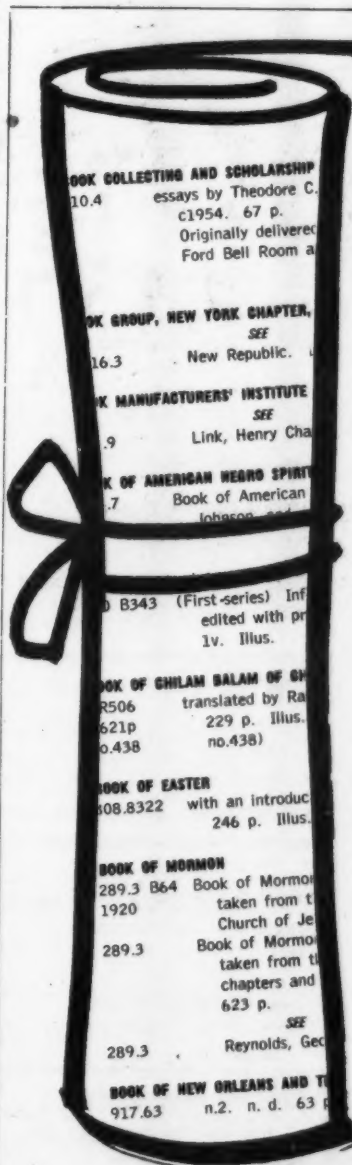
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Calendar

CONFERENCES, SYMPOSIA

Nov. 6 - 8, Urbana, Ill. - Computer Graphics Conference. Contact: Prof. C.W. Gear, Dept. of Comp. Sci., University of Illinois, Urbana, Ill., 61801.

Nov. 6 - 8, Kansas City, Mo. - Data Processing Management Assn. Fall Conference, Muelebach Hotel and the Municipal Auditorium, Contact: DPMA, 505 Busse Hwy., Park Ridge, Ill. 60068

Nov. 10, New York City - Symposium: Applications of Computers to Problems of Urban Society. Hilton Hotel, N.Y.C. Sponsored by ACM. Contact: J.M. Spring, Computer Methods Corp., 866 Third Ave., N.Y., N.Y.

Nov. 14 - 16, Anaheim, Calif. - Fall Joint Computer Conference. Convention Center. Contact: AFIPS, 345 E.47th St., N.Y., N.Y., 10017.

Nov. 27 - 29, New York City - American Management Assn. meeting on "Administrative Management in the Electronic Era," Contact: AMA, 135 W 50th St., N.Y., N.Y., 10020.

USERS' MEETINGS

Nov. 10 - 11, Anaheim, Calif. - Users' Meeting on Computers in the Laboratory. Jolly Roger Motor Inn. Sponsored by DECUS, Maynard, Mass., 01754.

SEMINARS, WORKSHOPS

Nov. 15 - 17, Phoenix, Ariz. - 15th Annual Electronics Seminar, "EDP - Potential for Management." Sponsored by American Gas Association - Edison Electric Institute Electronic Data Processing Committee. Hotel Westward Ho, Phoenix.

SHOWS, EXPOSITIONS

Nov. 5 - 7, Minneapolis, Minn. - Business Equipment Show and Seminar of the Administrative Management Society, Convention Hall, Minneapolis Auditorium, Contact: AMS, Maryland Ave., Willow Grove, Pa. 19090

Nov. 6 - 9, Montreal, Canada - Canadian National Business Show, sponsored by the Canadian Business Equipment Manufacturers Assn., Inc., at the Place Bonaventure, Contact: G.D. Wynd, General Manager, 144 Victoria St., Toronto 1, Ont., Canada

How They Moved Last Week

Week Ending November 3, 1967

| | 1967 | | Week | | Last | Week | | Week |
|--------------------------------|---------|---------|---------|---------|---------|---------|--------|------|
| | High | Low | High | Low | | Net | Change | |
| <u>NEW YORK STOCK EXCHANGE</u> | | | | | | | | |
| Addressograph-Multigraph | 75 1/4 | 46 7/8 | 75 1/4 | 66 1/4 | 67 1/4 | - 5 1/8 | - 7.08 | |
| American R&D | 165 3/4 | 37 3/4 | 165 3/4 | 147 1/4 | 147 7/8 | - 8 7/8 | - 3.44 | |
| Ampex Corp. | 40 3/4 | 22 3/4 | 33 3/4 | 30 1/4 | 33 | - 3/4 | - 2.22 | |
| Burroughs | 174 1/8 | 80 7/8 | 170 3/4 | 153 1/4 | 153 1/4 | -13 5/8 | - 8.16 | |
| Collins Radio | 114 7/8 | 53 | 108 | 99 5/8 | 100 7/8 | - 3 3/8 | - 3.24 | |
| Control Data | 163 | 33 1/2 | 156 7/8 | 147 3/8 | 148 3/8 | - 8 5/8 | - 5.50 | |
| Electronic Associates | 30 1/4 | 16 3/4 | 27 1/2 | 24 3/8 | 25 | - 2 1/8 | - 7.83 | |
| General Electric | 115 7/8 | 82 1/2 | 109 1/2 | 100 | 100 | - 9 1/4 | - 8.26 | |
| Honeywell | 100 3/4 | 63 1/2 | 99 3/8 | 88 | 88 1/4 | - 8 1/8 | - 8.43 | |
| IBM | 600 1/2 | 362 1/2 | 600 1/2 | 576 | 580 | -16 3/8 | - 2.74 | |
| Litton | 120 3/8 | 79 1/2 | 119 7/8 | 104 3/4 | 105 1/2 | -14 3/8 | -11.97 | |
| Nat Cash Register | 131 | 67 1/8 | 128 1/2 | 121 3/4 | 122 1/2 | - 3 3/4 | - 2.97 | |
| RCA | 65 1/2 | 42 5/8 | 65 1/2 | 60 5/8 | 60 5/8 | - 2 3/4 | - 4.34 | |
| Raytheon | 116 1/4 | 49 | 116 1/4 | 109 | 113 3/8 | + 3 1/8 | + 2.83 | |
| Sanders | 68 | 37 5/8 | 64 5/8 | 58 3/4 | 62 1/2 | + 2 1/2 | + 4.17 | |
| Scientific Data | 135 1/2 | 70 3/8 | 134 1/2 | 122 1/2 | 124 1/2 | - 9 | - 6.74 | |
| SON | 82 1/4 | 44 1/8 | 46 1/4 | 44 1/8 | 44 3/8 | - 1 5/8 | - 3.49 | |
| Sperry Rand | 57 7/8 | 28 1/8 | 56 3/8 | 51 5/8 | 51 3/4 | - 4 | - 7.18 | |
| NYSE COMPUTER STOCK AVERAGE | | | | | | - 5.90 | - 4.93 | |

| AMERICAN STOCK EXCHANGE | | | | | | | | |
|--------------------------------|---------|--------|---------|---------|---------|---------|--------|--|
| Audio Devices, Inc. | 30 3/8 | 21 5/8 | 23 7/8 | 22 | 22 1/2 | - 1 | - 4.25 | |
| Automatic Data Processing | 50 3/4 | 41 1/2 | 48 7/8 | 45 | 45 | - 2 | - 4.26 | |
| CalComp | 99 1/8 | 60 1/4 | 87 7/8 | 82 3/4 | 83 5/8 | - 2 3/4 | - 3.18 | |
| Computer Applications | 39 3/8 | 14 | 35 1/2 | 33 3/4 | 33 3/4 | - 2 1/8 | - 5.92 | |
| Computer Sciences | 47 3/8 | 18 | 44 7/8 | 40 7/8 | 41 5/8 | - 1/2 | - 1.19 | |
| Digital Equipment Corp. | 129 3/4 | 29 3/8 | 129 3/4 | 109 | 109 3/4 | -11 1/4 | - 9.30 | |
| GC Computer Corp. | 41 | 23 1/4 | 28 1/8 | 25 1/4 | 25 1/4 | - 2 | - 7.34 | |
| Leasco | 93 1/2 | 33 5/8 | 84 | 77 1/8 | 81 5/8 | + 4 3/8 | + 5.66 | |
| Levin-Townsend Computer Corp. | 57 | 10 7/8 | 52 7/8 | 49 1/4 | 50 1/4 | - 1 5/8 | - 3.14 | |
| Milgo Electronics | 45 5/8 | 5 1/8 | 11 | 9 1/2 | 9 5/8 | - 1 1/4 | - 1.15 | |
| Mohawk Data Sciences | 183 | 155 | 183 | 157 1/2 | 161 7/8 | -17 5/8 | - 9.82 | |
| Planning Research | 35 3/4 | 27 5/8 | 34 7/8 | 31 1/2 | 31 7/8 | - 2 3/8 | - 3.58 | |
| Potter Instrument | 37 3/8 | 12 3/8 | 32 1/4 | 26 | 26 7/8 | - 4 1/8 | -13.31 | |
| Randolph Computer Corp. | 44 7/8 | 33 | 41 1/2 | 36 1/4 | 36 1/2 | - 2 | - 5.20 | |
| AMEX COMPUTER STOCK AVERAGE | | | | | | - 3.30 | - 4.71 | |

| | 1967 | | Friday | | Last | Week | Week |
|------------------------------|--------|--------|--------|--------|--------|---------|--------|
| | High | Low | Bid | Asked | Friday | Change | Change |
| <u>OVER-THE-COUNTER</u> | | | | | | | |
| Applied Data Research | 30 | 3 1/8 | 27 1/2 | 29 1/2 | 26 1/2 | + 1 | + 3.77 |
| Bolt, Beranek & Newman, Inc. | 30 | 8 1/4 | 23 | 23 3/4 | 23 3/4 | - 3/4 | - 3.16 |
| C-E-I-R, Inc. | 22 | 6 5/8 | 21 1/4 | 21 3/4 | 21 1/2 | - 1/4 | - 1.16 |
| Computer Usage | 64 | 20 1/4 | 59 | 61 | 60 1/2 | - 1 1/2 | - 2.48 |
| Cyber-Tronics | 17 1/2 | 4 3/4 | 11 3/4 | 12 1/2 | 12 | - 1/4 | - 2.08 |
| Data Products | 17 7/8 | 2 1/2 | 14 5/8 | 15 | 15 1/8 | - 1/2 | - 3.31 |
| Digitronics | 18 1/4 | 6 | 14 | 14 1/2 | 14 3/4 | - 3/4 | - 5.08 |
| DPA, Inc. | 16 1/4 | 4 1/4 | 8 7/8 | 9 3/8 | 9 1/2 | - 5/8 | - 6.58 |
| Electronic Memories | 56 1/2 | 12 3/4 | 53 1/2 | 54 1/2 | 53 1/2 | - 2 | - 3.60 |
| Fabri-Tek | 15 3/4 | 8 | 8 1/4 | 8 3/4 | 9 5/8 | - 1 3/8 | -14.29 |
| IMC Data, Inc. | 13 5/8 | 7 3/8 | 11 | 11 1/2 | 11 3/8 | - 3/8 | - 3.30 |
| Management Assistance | 24 3/8 | 10 1/8 | 12 1/8 | 12 1/2 | 10 1/8 | + 2 | +19.75 |
| Memorex | 226 | 63 | 172 | 175 | 191 | -19 | - 9.84 |
| Optical Scanning Corp. | 92 1/2 | 25 3/4 | 64 | 66 | 63 1/2 | + 1/2 | + 0.79 |
| Recognition Equipment, Inc. | 131 | 48 1/2 | 102 | 106 | 104 | - 2 | - 1.92 |
| Systems Engineering Labs | 56 3/4 | 8 7/8 | 53 | 55 | 56 3/4 | - 3 3/4 | - 6.60 |
| University Computing Co. | 128 | 65 | 124 | 127 | 126 | - 2 | - 1.59 |



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Study Indicates That Computer Hires Last Year Cost \$2,087 Per Relocation Expense \$2,045 A Person!

The cost of hiring EDP professional people, such as computer center managers, systems analysts and programmers, was \$2087 per person employed in 1966. This is a sharp increase from an average expense of \$1541 per hire during 1965 for the same class of professional people.

The cost-per-hire figures are one of the results of a survey of hiring costs of 141 large organizations, conducted by Deutsch & Shea, Inc., New York, an advertising agency specializing in the recruitment field.

Interestingly, cost-per-hire in the EDP field during 1966 is one of the

highest in the country, exceeded only by the CPH for professional people in the petroleum (\$2475) chemical (\$2165) and nuclear field (\$2155).

The average relocation expenses for EDP people were even higher comparatively. They ran \$2045 per hire during 1966, which is the highest in the country except in the petroleum field, where the average relocation cost ran \$2285. By contrast, relocation expense in the research and development field ran only \$511 per man last year. Apparently, companies are willing to move skilled EDP people over considerable distances in order to get the man they want on board.

The cost-per-hire figures were calculated by asking the recruiting departments of the companies surveyed to divide their total recruiting budget for

each professional field by the number of professional people hired in that field during each year.

The largest gain in cost-per-hire in 1966 was in the EDP field, which had the \$546 per man gain indicated above. By contrast, aerospace CPH increased by only 1%, and the communications, petroleum and nuclear fields saw a drop of approximately 10% in cost-per hire.

Relocation expenses are, on the average, paid when the future employee lives beyond a 40-mile radius of the company, according to the information supplied by survey participants. A per diem allowance reported was \$13

Almost half of the firms surveyed pay special expenses relating to starting up a new household, such as connecting TV antennas, automatic washing machines and the like. About four out of five of the firms provide storage costs for household goods. The average period allowed for storage is two months.

Also, a per diem allowance is paid to the new professional hires by 65% of the firms surveyed. The average per diem allowance reported was \$13

and three weeks was the average period during which it was paid.

The complete results of the survey are contained in a report "Technical Manpower Recruiting Practices 1966-1967", available for \$6.50 per copy from Deutsch & Shea, 49 East 53rd Street, New York City.

Photo-Digital Memory

Continued from Page 9

circuitry converts the signals to binary bits for delivery to the host computer.

Special logic circuits in the photo-digital system generate error detection and correction codes which are appended to each line of data as it is recorded. These codes, mathematically derived from the data bits of the line, can be used to correct retrieved information prior to delivery to the host computer. By using this technique, corrections can be made without re-processing the data.

The control strategy of the mass storage system is designed to keep many diverse processes in motion at the same time. The complex task of organizing and executing these simultaneous events is assigned to a processor similar to the central unit of a standard process control computer.

The processor operates under the direction of a stored program of instructions that translates requests from

the host computer into a series of specific commands to the processor. The processor, in turn, initiates the appropriate hardware action required to carry out the request.

Through a two-way communications channel with the various modules in the system, the control processor activates and controls discrete operating mechanisms at a very detailed level, as well as co-ordinating the overall sequence of events.

Off-Line Rand Tablet

SANTA ANA, CALIF. - Bolt Beranek and Newman, Inc. now offers off-line sketch input based on the RAND tablet. This is in addition to the on-line to 360s Grafacon GI/360 which was described in last week's COMPUTERWORLD. The company has just introduced the Grafacon 206-1 Punched Tape Digitizing System.

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Forbes Quotes IBM Chairman

Watson Says 'CDC 6600 Tops 360 For Science'

Says There Is No Formal Planning Now

In an interview, published in Forbes this week, IBM Chairman Thomas J. Watson says that the big difference between IBM and the other computer companies has not been between their respective products — but in their managements. He went further, and accepted the fact that the CDC 6000s were better machines for scientific work than the IBM 360s. This he explained by saying that the 360 had been built for use when there was both scientific and business computing to be handled. He implied that the compromises in design, which were made in order to achieve this goal, were to blame for the inferior performance of the IBM systems in the pure scientific work.

Commenting on this, Watson noted, "We have never been able to design all things to all men, big as we are."

IBM Management to Centralize

In describing the role of management within the IBM Corporation, he said that IBM was returning to the centralized management system which used to exist in 1946. This is happening because of the way the 360 system fits all their products together. He believes that it will be possible to centralize and remain dynamic — and that, in any case, the technology situation is forcing the company into the decision.

Staffing Policies

Discussing the staffing situation, Mr. Watson laid great emphasis on the problems of motivating IBMers to feel

Wives Ask If IBM Is A Sweat Shop

that it is THEIR company. One technique which is being used is to place very high priority on the problems of "unhappy" employees. Another is to provide a system where the IBMers can "go around" his boss. Mr. Watson regretted that this system is used more to bring up complaints about personal discrimination than to bring new ideas to the company, but, despite this fact, he considered it a most important management tool.

He commented that their employees will do unusual things to guarantee the success of the business, and that they do it uncomplainingly. Wives, however, are another matter, and the company does hear from them asking if IBM is a sweat shop.

No Organized Planning

Apparently an attempt to introduce planning into the corporation failed when the man in charge left, thinking no one cared about him. Planning is now handled in conversations with line executives.

Antitrust vs Technology

In commenting on the impressive growth of IBM from a \$150 million company to a \$5 billion company in only twenty years, Watson posed the question, "How big should a U.S. company get?" He answered by noting, "I worry about two forces. One is that a big company, no matter how good, has influence on the market. When there are four small companies, the self-policing in the market is much stronger."

"On the other hand, there are drawbacks in the fragmented market. Each

economic entity is so small that it can't bring enough dollars to whet technical problems quickly. If you're big, you have the antitrust problem. You are small, you have the technological problems. I don't have any answers, but it's a fascinating question. Abroad, we have the resources to attack computer problems. Germany says it wants its own computer company, so it gives some company \$10 million or \$20 million. You can't take much of a cut with that."

Thirty-Seven Copies of Forbes

Industry observers were somewhat shocked when they saw the published interview. One suggested that some things could have been better phrased. "Can't you imagine the scene?" he said. "There you are, making a presentation for a big 360/65 order. The door bursts open and — in comes the CDC guy with THIRTY-SEVEN copies of Forbes? Wow!!!"

No comment was officially available from IBM.

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Keeps Drs. Doctoring Computer Service Started For Professional People

LOS ANGELES, CALIF. The Foundation for Advanced Computer Technology (FACT), today announced that it had granted exclusive national rights to Accountronics to use the advanced Medicounting and Medicard system developed over the past few years.

Mr. Fred Furry, president of Computab, a major Los Angeles based computer center said that "The system is almost unbelievable in its completeness and advanced sophistication."

The system features use of an "optical scanner" of input data which means that the tremendous labor and error factor of the key-punch method is eliminated. It includes patient statements which are "aged", which contain "insurance codes", "thank-you", "collection" and "no charges", and even includes patient "recall for check-up" reminders.

Controlled office procedures eliminate possibilities of theft and embezzlement, while at the same time the staff's and doctor's time is reduced to less than two minutes per patient for all office functions. A special "Delinquency Control" runs with every report, and is produced as a help in making difficult collections.

The Management Analysis includes "Management-by-Exception" principles, Current Month and Year-to-Date, Patient and Doctor Activity, and even a Time Study of Hours worked as a ratio to dollars generated. No special equipment or training is needed to use the program.

Of perhaps the greatest significance are the versatile "Insurance Forms" produced as an automatic part of the computer record. They contain certificates for Governmental Insurance such as Medicare and Medical, Private Insurance Certificates, the Doctor's Certificate, and all information needed to qualify with any insurance carrier for payment. It even breaks down the Workman's Compensation Claims from Private or Governmental sources.

The whole system marks the first time any complete integrated approach has been available to the Medical-Dental Profession.

In commenting on past efforts, Mr. Furry said "Up to this time, many tab-card systems have been tried and some have even succeeded in obtaining a low enough error factor to be of advantage to the users. However, until the development of the labor saving Optical Scanner and the programming and systems which would allow it to be used, all systems were stringently limited to just basic billing and analysis. FACT developed the creative methods of applying advanced techniques to these "doctor-accounting" problems and we are very proud that we were chosen to implement and market them."

Accountronics plans to cover the nation with Executive Directors operating the system in local communities. The servicing is so designed that no computer experience is needed by the local executive director, and all the Accountronics medical data-processing is done under contract with COMPUTAB, Inc. Mr. Furry has been active in the data processing field since 1938 with primitive 1st generation computer systems, and is acknowledged as a leader in present development.

Southern California is now being developed as a "pilot" for nation-wide expansion. The national headquarters for Accountronics is at 14325 South Figueroa, Los